

Preparing Students for STEM Careers

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Introduction

“The growth paradigm that has driven our economy for the past generation is exhausted” (Palley, 2008, p. B10). Yet the demand for skilled workers in science, technology, engineering, and math (STEM) is closely linked to global competitiveness. How can counselors inspire students to solve problems in the frontiers of alternative energy, climate change, nanotechnology and space exploration, while promoting STEM careers...that is a key question in career development.

Friedman (2008) suggests that energy technologies (ET) can solve worldwide environmental issues and create the economic stimulus needed to rebuild America. Yet, the lack of gender and ethnic diversity of students entering STEM educational programs and career fields present additional challenges. Using creativity and innovation to address these challenges is critical to providing career development.

What’s the Fuss about STEM?

The National Academies (National Academy of Science, the National Academy of Engineering, and the Institute of Medicine, 2007), noted the rapid erosion in the U.S.’s competitiveness in science and technology—and thus in the U. S. as a global economic leader. They cautioned that the U.S. position as a global leader may be abruptly lost without a greatly expanded commitment to achieving success in advanced education in science, technology, math, and engineering. The National Science Foundation states:

In the 21st century, scientific and technological innovations have become increasingly important as we face the benefits and challenges of both globalization and a knowledge-based economy. To succeed in this new information-based and highly technological society, all students need to develop their capabilities in science, technology, engineering, and mathematics (STEM) to levels much beyond what was considered acceptable in the past. (p.1)

Not enough young people are being educated or inspired about interest in advanced math, science, and engineering. “The education in American junior high schools, in particular, seems to be a black hole that is sapping the interest of young people, particularly young women, when it comes to the sciences”. (Friedman, 2005, p.351)

Technology is pervasive in almost every aspect of daily life, and as the workplace changes, STEM knowledge and skills are important for a variety of workers (not just for mathematicians and scientists) (The Center for Education Policy Analysis, 2008). In addition to STEM knowledge, the ways in which problems are approached and solved in these subjects are increasingly necessary for workers (The Center for Education Policy Analysis, 2008).

Rising Above the Gathering Storm (2007), the seminal report about STEM, is of great value to career practitioners and policy makers. It recommends the need to (1) increase America’s talent pool by vastly improving K-12 mathematics and science education; (2)

sustain and strengthen the nation's commitment to long-term basic research; (3) develop, recruit, and retain top students, scientists, and engineers from both the U.S. and abroad; and (4) ensure that the U.S. is the premier place in the world for innovation. Historically, the U.S. has been a leader in these areas. Now only 15% of U.S. graduates are attaining degrees in the natural sciences and engineering, compared to 50% in China (Freeman, 2008). It is estimated that the U.S. will need 1.75 million more engineers, a 20% increase, by the year 2010 (Gasbarra & Johnson, 2008). Demand for engineers is increasing at three times the rate of other professions (Gasbarra & Johnson, 2008).

Diversity Challenges

Helping under-represented populations pursue STEM careers is an additional challenge. Women, although traditionally under-represented, are in high demand in these fields (Gasbarra & Johnson, 2008). Stereotypes about women's abilities and their role in the family often keep women from pursuing math and science careers. Furthermore, the atmosphere in these male-dominated fields is often challenging, if not inhospitable, to women (Gasbarra & Johnson, 2008).

Hispanics, who are the largest and fastest growing minority group in the United States, are largely under-represented in STEM fields (Gasbarra & Johnson, 2008), and face hurdles in trying to achieve academically. Hispanic students are disproportionately represented in poor, urban schools with lower quality of education and poor bilingual programs (Gasbarra & Johnson, 2008). Poverty, language barriers, and family commitments are often obstacles to success. Because few Hispanic parents have attended college, they may have little familial support for attending college, much less for studying science or engineering. With the growing need for more engineers, American businesses and Hispanic communities could both benefit from more Hispanic students being encouraged and supported in pursuing STEM careers (Gasbarra & Johnson, 2008).

The reasons for limited diversity in the STEM fields are broad and cannot be addressed overnight. However, career practitioners can better encourage and support students, especially those in under-represented populations, to enter high-demand STEM fields.

Recommendations

- 1) Connect students with role models in STEM fields, especially women and ethnic minorities in non-traditional programs and careers. If there are few professionals available in these fields, consider inviting college students working towards STEM degrees.
- 2) Promote STEM in tangible and real-life oriented ways. Connect academic courses with career and technical education (CTE) programs, such as teaching geometry through construction (The Center for Education Policy Analysis, 2008). Students are often motivated to learn if they understand the real world applications of what they are learning.
- 3) Visit www.stemcareer.com a clearinghouse site for those seeking and promoting STEM careers.

- 4) Promote fun ways to explore STEM interests through Space Camp (www.spacecamp.com), Camp Kennedy's Space Center (<http://www.kennedyspacecenter.com/educatorsParents/camp.asp>), NASA's Kid's Club (<http://www.nasa.gov/audience/forstudents/index.html>) and local STEM career fairs within educational settings.
- 5) Explore materials that offer insights about STEM such as NASA's <http://www.nasa.gov/audience/foreducators/index.html> and <http://education.nasa.gov/edprograms/core/home/index.html> , The Gender Clip Project Project <http://www.genderchip.org> , the Sloan Career Cornerstone Center <http://www.careercornerstone.org/diversity.htm> , and the Real Game 2.0 at <http://www.realgameonline.ca>

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